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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 09/877,366 Filing Date: June 8, 2001  
Confirmation No.: 1516  
First Named Inventor: Sam Kao  
Assignee: Tru-Si Technologies, Inc.  
Examiner: Kackar, Ram N. Art Unit: 1763  
Attorney Docket No.: M-9925 US

San Jose, California  
June 2, 2004

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**APPEAL BRIEF**

Dear Sir:

This Appeal Brief is being filed in triplicate after the final Office Action dated March 9, 2004. A Notice of Appeal and an Amendment with Appeal are being filed herewith. This Appeal Brief includes the following Exhibits:

Exhibit A - Kunio et al. (JP 5704523), with an English language abstract.

Exhibit B - *In re Mills*, 16 USPQ2d, pages 1430-1433 (Fed. Cir. 1990).

**Real Party in Interest**

The real party in interest is Tru-Si Technologies, Inc., a company having an office in Sunnyvale, California.

**Related Appeals and Interferences**

None.

### **Status of Claims**

Claims 1-5, 7-12, 18-30 were rejected. The rejection of these claims is being appealed.

Claim 6 was objected to.

Claims 13-17 were canceled.

### **Status of Amendments**

An amendment is being filed herewith to correct typographical errors in Claims 18, 20, 23, 26, 30.

### **Summary of Invention**

One embodiment of the present invention is a semiconductor wafer holder 130 (Fig. 2). Wafer 134 is held near holder 130 by means of gas vortices emitted from vortex chucks 202.1-202.4. The vortices flow towards the wafer. Each vortex has a low pressure region that draws the wafer 134 to the surface 250 of holder 130. At the same time, gas escaping from vortex chucks 202.1-202.4 “creates a gas cushion between the wafer and the holder that prevents the wafer from contacting the holder’s surface 250.” Specification, page 3, lines 29-33.

The gas vortices may cool the wafer. The cooling is not uniform, and may negatively affect the wafer processing. “Portions of the wafer near the vortex outlets are cooled more than the rest of the wafer” (specification, page 1, lines 13-14). Consequently, if the wafer processing is temperature sensitive (e.g. an etch with a temperature dependent etch rate), the processing uniformity is negatively affected.

“Some embodiments of the present invention exploit the non-uniform cooling by the vortices to compensate for other conditions that create temperature non-uniformity” (specification, page 1, lines 18-19). In the system of Fig. 1, wafer holders 130 rotate around axis 140X, passing in and out of plasma jet 120. When a wafer passes through the plasma, the wafer is heated. When the wafer is out of the plasmas, the wafer is cooled by ambient

atmosphere. “The wafer points farther from axis 140X can have higher linear velocities, and be cooled more by the ambient gas, than the wafer points close to axis 140X.” Specification, page 2, lines 16-18 and 29-30. Therefore, the vortex chucks are arranged to provide less cooling to the points with higher velocities and more cooling to the points close to axis 140X. Vortex chucks 202.1, 202.2 are closer to axis 140X than chucks 202.3, 202.4, and chucks 202.1, 202.2 “are constructed to have a greater cooling effect on the wafer than chucks 202.3, 202.4 (specification, page 3, lines 5-7).

There are many ways to provide different cooling by different chucks. In Fig. 2, the gas flows through a passage 428 and an inlet 430 into a cavity 420, and from cavity 420 into the vortex chambers of the individual chucks through respective passages 330. The cooling effect of each chuck can be controlled by varying the chuck’s geometry. In one embodiment, the chucks 202.3, 202.4 have more narrow passages 330 than the chucks 202.1, 202.2 (specification, page 3, lines 20-21). The more narrow passages restrict the gas flow and thus reduce the cooling effect (page 4, lines 1-6).

In Fig. 2, chucks 202.1, 202.2 include an additional gas inlet 440. “The gas flowing through passages 440 increases the total gas outflow from chucks 202.1, 202.2 and thus enhances the cooling” by these chucks (page 4, lines 15-16).

In another embodiment, all of the chucks have passages 440, but these passages are wider in chucks 202.1, 202.2 (page 4, lines 25-26). Also, the chucks’ vortex chambers 320 may have different geometries, e.g. the chamber diameters may be different, or some chambers 320 may have a smoother inner surface than other chambers (page 4, lines 27-32). The invention is not limited to any particular way of providing different cooling by different chucks, or to the number of chucks providing a greater or lesser degree of cooling, or to the number of different chuck types and the number of different degrees of cooling that can be employed. In some embodiments, the chucks may or may not provide different cooling effects, but there are more chucks per unit area adjacent to axis 140X than farther away from the axis (page 5, lines 27-41).

The invention is not limited to the features discussed herein. The invention is not limited to holders of semiconductor wafers (page 6, lines 14-15). The invention is not limited to any particular use of a holder. The holder may be suitable for a non-temperature-sensitive processing. All the claims on appeal are structure claims, not necessarily limited to a use.

### **Issues**

1. Whether Claims 1-5, 7-12, 18-23, 28-30 are unpatentable under 35 U.S.C. 103(a) over Kunio et al. (JP 5704523, copy attached as Exhibit A) in view of Siniaguine (U.S. patent 6,139,678).

2. Whether Claims 18, 24-27 are unpatentable under 35 U.S.C. 103(a) over Bollinger et al. (U.S. patent 6,467,297) in view of Siniaguine.

### **Grouping of Claims**

1. With respect to Issue 1, Claims 1-5, 7-12, 18-23, 28-30 do not stand or fall together but are separately patentable.

2. With respect to Issue 2, Claims 18, 24-27 do not stand or fall together but are separately patentable.

### **Argument**

**Issue 1:** Whether Claims 1-5, 7-12, 18-23, 28-30 are unpatentable under 35 U.S.C. 103(a) over Kunio et al. (JP 5704523) in view of Siniaguine (U.S. patent 6,139,678).

**Claim 1** recites an article holder with first and second vortex chambers, and states:

... a combination of the first vortex chamber with all of the gas inlet and outlet passages terminating at the first vortex chamber is not geometrically identical to a combination of the second vortex chamber with all of the gas inlet and outlet passages terminating at the second vortex chamber.

Kunio discloses a “swirl-making chamber 2”, but does not disclose combining different geometries of the swirl-making chambers in a single holder as recited in Claim 1. The Examiner admits that Kunio “does not disclose vortices with variable inlet cross-section area, variable distribution of vortices on the article holder, variable amount of gas in some vortices...”

Siniaguine is cited for disclosing “non-contact wafer holders mounted to an angle drive”. Siniaguine does not teach or suggest that his wafer holders 130 combine different geometries as recited in Claim 1. Therefore, Siniaguine and Kunio, taken singly or together, do not teach Applicant’s invention.

The Examiner states:

Regarding claims 1, 2, 4, 8, 10, 12, 21 and 28 the features related to the geometry ... of vortices, control the amount and location of pressure on the substrate and would need to be adjusted for implementing specific applications. Adjusting size of elements for optimization has been held obvious.

Kunio and Siniaguine do not however teach an adjustment that would lead to different chamber and inlet and outlet geometries in a holder as recited in Claim 1, and Kunio and Siniaguine do not teach or suggest that the different geometries are needed for optimization. The Examiner does not point to any prior art adjustment method that would lead to different geometries, or to any suggestion or motivation for such a method in the prior art. “To establish a *prima facie* case of obviousness,” the prior art must provide “some suggestion or motivation” to modify the references. See MPEP 2143 and the cases cited therein.

See also *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). A copy of the *In re Mills* opinion is enclosed as Exhibit B. In that case, the prior art teaching included a speed adjustment by a “variable speed transmission”. The Federal Circuit found that the prior art speed adjustment did not make obvious the speed modification needed to arrive at the claimed invention because there was no “suggestion or motivation” for such a modification in the prior art. 16 USPQ2d 1432. This case is discussed in more detail below.

**Claim 2** depends from Claim 1, and Claim 2 is separately patentable because it recites that “all of the one or more gas inlets terminating at the first vortex chamber have a larger combined cross-sectional area than all of the one or more gas inlets terminating at the second vortex chamber”. Claim 2 is supported by Applicant’s specification, page 4, lines 1-4 (“dimensions of the passages 330 ...”) and lines 25-26 (“wider passages 440”).<sup>1</sup>

Kunio does not teach or suggest combining “swirl making chambers” with different combined inlet cross sectional areas as recited in Claim 2. Siniaguine is no more pertinent. Therefore, even assuming for the sake of argument the existence of a prior art adjustment method to “control the amount and location of pressure on the substrate” (Office Action, page 3), there is no suggestion in the two cited references that the method would lead one skilled in the art to combine vortex chambers with different combined inlet cross sectional areas in an article holder as recited in Claim 2.

**Claim 3** depends from Claim 2, and Claim 3 is separately patentable because it recites “an apparatus for rotating the article holder around at least one axis, wherein a minimum distance between said axis and the first vortex chamber” (i.e. the chamber with a larger combined inlet cross sectional area) “is smaller than a minimum distance between said axis and the second vortex chamber” (the chamber with a smaller combined inlet cross section area).

Siniaguine teaches rotation of a wafer holder 130 (Fig. 1) around an axis 140X, but does not teach or suggest placing a vortex chamber with a larger combined inlet cross sectional area closer to axis 140X than a vortex chamber with a smaller combined inlet cross sectional area as recited in Claim 3. Kunio is no more pertinent in this regard than Siniaguine.

**Claim 4** depends from Claim 1, and Claim 4 is separately patentable because it recites that “the first gas vortex chamber has more gas inlets than the second gas vortex

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<sup>1</sup> Claim 2 is not limited to the embodiments discussed herein.

chamber”. Claim 4 is supported by Applicant’s Fig. 2 and specification, page 4, lines 24-28 (identical passages 330 but the passages 440 are absent from chucks 202.3, 202.4).<sup>2</sup>

Kunio does not teach or suggest a combination of swirl-making chambers with different numbers of inlets as recited in Claim 4. Siniaguine is no more pertinent.

**Claim 5** depends from Claim 4, and Claim 5 is separately patentable because it recites “an apparatus for rotating the article holder around at least one axis, wherein a minimum distance between said axis and the first vortex chamber” (i.e. the chamber with more gas inlets) “is smaller than a minimum distance between said axis and the second vortex chamber” (the chamber with fewer gas inlets).

Siniaguine does not teach or suggest placing a vortex chamber with more gas inlets closer to his axis 140X than a vortex chamber with fewer gas inlets as recited in Claim 5. Kunio is no more pertinent.

**Claim 7** is separately patentable because it depends from allowable Claim 6 (Claim 6 was objected to).

**Claim 8** is supported by Applicant’s specification, page 5, lines 27-31. The holder surface 250 has a portion 250A (Fig. 4) closer to axis 140X and another portion 250B. Portions 250A, 250B have equal areas. “In some embodiments, the portion 250A contains more vortex chuck outlets than the portion 250B”.

Claim 8 is not limited to the embodiments discussed herein.

Kunio does not teach or suggest having different numbers of swirl making chamber outlets in different portions of equal areas as recited in Claim 8. Siniaguine is no more pertinent. The two cited references, taken singly or together, do not teach or suggest an adjustment method to “control the amount and location of pressure on the substrate” (Office Action, page 3) that would provide different numbers of vortex chuck outlets in different surface portions as recited in Claim 8. See MPEP 2143 and *In re Mills* (Exhibit B).

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<sup>2</sup> Claim 4 is not limited to the embodiments discussed herein.



**Claim 9** depends from Claim 8, and Claim 9 is separately patentable because it recites “an apparatus for rotating the article holder around at least one axis, wherein a minimum distance between said axis and the first portion of said surface” (i.e. the portion with more outlets) “is smaller than a minimum distance between said axis and the second portion” (the portion with fewer outlets).

Siniaguine does not teach or suggest placing more outlets on a surface portion closer to his axis 140X than a surface portion of an equal area farther from his axis 140X as recited in Claim 9. Kunio is no more pertinent.

**Claim 10** recites that a first surface portion “has a larger percentage of its area occupied by the vortex chuck outlets” than a second surface portion. Claim 10 is supported by Applicant’s specification, page 5, lines 29-31, but is not limited to the embodiments discussed therein.

Kunio does not teach or suggest having surface portions with different percentages occupied by swirl making chamber outlets as recited in Claim 10. Siniaguine is no more pertinent. The two cited references, taken singly or together, do not teach or suggest an adjustment method to “control the amount and location of pressure on the substrate” (Office Action, page 3) that would provide surface portions with different percentages occupied by vortex chuck outlets as recited in Claim 10.

**Claim 11** depends from Claim 10, and Claim 11 is separately patentable because it recites “an angle drive having an arm attached to the article holder and having an axis of rotation, wherein all of the first portion of said surface lies closer to said axis than all of the second portion”.

Siniaguine does not teach or suggest placing a surface portion with a larger percentage occupied by vortex chuck outlets closer to his axis 140X than a surface portion with a smaller percentage occupied by the vortex chuck outlets as recited in Claim 11. Kunio is no more pertinent.

**Claim 12** depends from Claim 10, and further recites that the first and second portions have equal areas. The Examiner has not identified a teaching or suggestion in the prior art for an adjustment method providing the structure of Claim 12.

**Claim 18** recites first and second vortex chambers to be positioned opposite to respective first and second portions of the article “for greater cooling of the first portion of the article by the one or more first vortex chambers than of the second portion of the article by the one or more second vortex chambers”.

Claim 18 is supported by Applicant’s Fig. 2. Vortex chucks 202.1, 202.2 are positioned opposite to a first portion of wafer 134 (the portion closer to axis 140X). Chucks 202.3, 202.4 are positioned opposite to a second portion of wafer 134 (the portion farther away from axis 140X). Chucks 202.1, 202.2 cool the first portion of the wafer more than the chucks 202.3, 202.4 cool the second portion of the wafer.

Claim 18 is not limited to the embodiments discussed herein.

Kunio and Siniaguine do not teach or suggest the “greater cooling” feature of Claim 18.

The Office Action states on page 4, last paragraph:

Applicant’s arguments regarding ... cooling are in regards to intended use.

This is respectfully traversed. The cooling language of Claim 18 is not merely an intended use but is a functional language structurally distinguishing the claim from the two references. MPEP 2173.05(g) states:

A functional limitation is an attempt to define something by what it does, rather than by what it is ... There is nothing inherently wrong with defining some part of an invention in functional terms ...

The case *In re Mills* (Exhibit B) involved an apparatus claim with a functional limitation. The invention was “an apparatus for producing aerated cementitious compositions... The essence of Mills’ invention is the machine’s ability to aerate a

cementitious composition by driving the output pump at a capacity greater than the feed rate, thereby drawing air into the composition.” 16 USPQ2d 1431. Mills’ Claim 6 recited:

drive motor means ... providing a pumping capacity of the pump means greater than the feed rate of the ingredients to the mixing chamber provided by the feed means, such that in operation air is drawn into the mixing chamber, and entrained in the mixed ingredients.

The claim had been rejected under 35 U.S.C. 103 over Mathis et al., U.S. patent 4,117,547. In explaining the rejection, the Board stated:

...the differences between claim 6 and the Mathis machine ... lie solely in the functional language of the claim.

The Board noted that “Mills is not claiming a method, but an apparatus, and all of Mills’ apparatus structure is present in the Mathis machine.” 16 USPQ2d 1432.

The Federal Circuit reversed the rejection because Mathis’ structure was not shown to provide the operation and function of Mills’ Claim 6:

The apparatus claimed by Mills is different from that of Mathis, since the fact that motor 6 of Mathis (the feed means) can be run at a variable speed does not require that motor 20 (connected to the pump) be run at a ... speed “such that in operation air is drawn into the mixing chamber and air entrained in the mixed ingredients.”

*Id.* The Court also stated:

While Mathis’ apparatus may be capable of being modified to run the way Mills’ apparatus is claimed, there must be a suggestion or motivation in the reference to do so.

*Id.*

In the instant case, the apparatus of Claim 18 is different from an apparatus obtained by combining Kunio and Siniaguine as suggested by the Examiner because the combined teachings of Kunio and Siniaguine do not provide the “greater cooling” function of Claim 18. Furthermore, Kunio and Siniaguine, taken singly or together, provide no “suggestion or motivation” for modifications needed to provide the “greater cooling” of Claim 18.

**Claim 19** depends from Claim 18, and Claim 19 is separately patentable because it recites “at least one angle drive for rotating the article holder around an axis, wherein a minimum distance between the axis and the one or more first vortex chambers” (the vortex chambers that provide greater cooling) “is smaller than a minimum distance between the axis and the one or more second vortex chambers”.

Siniaguine does not teach or suggest placing the “greater cooling” vortex chambers closer to his axis 140X as recited in Claim 19. Kunio is no more pertinent.

**Claim 20** depends from Claim 18, and Claim 20 is separately patentable because it recites “at least one drive for moving the article while the article is held in the holder so that at least a portion of the article directly opposite to the one or more second vortex chambers moves faster than at least a portion of the article opposite to the one or more first vortex chambers.”

Siniaguine does not teach or suggest that an article portion directly opposite to the one or more second vortex chambers (which provide less cooling) would move faster as recited in Claim 20. Kunio is no more pertinent.

**Claim 21** recites that “during operation each of the one or more first vortex chucks emits more gas per unit of time than each of the one or more second vortex chucks.”

Kunio does not teach or suggest this feature, and Siniaguine is no more pertinent. The two cited references, taken singly or together, do not teach or suggest an adjustment method to “control the amount and location of pressure on the substrate” (Office Action, page 3) that would provide different amounts of gas per unit of time as recited in Claim 21. See MPEP 2143 and *In re Mills*.

**Claim 22** depends from Claim 21, and Claim 22 is separately patentable because it recites “at least one angle drive for rotating the article holder around an axis, wherein a minimum distance between the axis and the one or more first vortex chucks is smaller than a minimum distance between the axis and the one or more second vortex chucks.”

Siniaguine does not teach or suggest placing a vortex chuck emitting more gas per unit of time closer to his axis 140X than a vortex chuck emitting less gas per unit of time as recited in Claim 22. Kunio is no more pertinent.

**Claim 23** depends from Claim 21, and Claim 23 is separately patentable because it recites “at least one drive for moving the article while the article is held in the holder so that at least a portion of the article directly opposite to the one or more second vortex chucks moves faster than at least a portion of the article opposite to the one or more first vortex chucks.”

Siniaguine and Kunio, taken singly or together, do not teach or suggest that an article portion directly opposite to the one or more second vortex chucks (emitting less gas per unit of time) would move faster as recited in Claim 23.

**Claim 28** recites “the first and second gas sources being operable to supply a gas to the first vortex chambers at a greater pressure than to the second vortex chambers.” Claim 28 is supported by Applicant’s specification, page 5, lines 13-16, but is not limited to the embodiments discussed therein.

Kunio does not teach or suggest a device operable to supply gas at different pressures to different chambers as recited in Claim 28. Siniaguine is no more pertinent. The two cited references, taken singly or together, do not teach or suggest an adjustment method to “control the amount and location of pressure on the substrate” (Office Action, page 3) that would lead to different gas pressures as in Claim 28. See MPEP 2143 and *In re Mills*.

**Claim 29** depends from Claim 28, and Claim 29 is separately patentable because it recites “at least one angle drive for rotating the holder around an axis, wherein a minimum distance between the axis and the one or more first vortex chambers is smaller than a minimum distance between the axis and the one or more second vortex chambers.”

Siniaguine does not teach or suggest placing a vortex chamber to which a gas is supplied at a greater pressure closer to his axis 140X than a vortex chamber to which a gas is supplied at a lesser pressure as recited in Claim 29. Kunio is no more pertinent.

**Claim 30** depends from Claim 28, and Claim 30 is separately patentable because it recites “at least one drive for moving an article while the article is held in the holder so that at least a portion of the article directly opposite to the one or more second vortex chambers moves faster than at least a portion of the article opposite to the one or more first vortex chambers.”

Siniaguine does not teach or suggest that an article portion directly opposite to the one or more second vortex chambers (where gas is supplied at a lesser pressure) would move faster as recited in Claim 30. Kunio is no more pertinent.

**Issue 2:** Whether Claims 18, 24-27 are unpatentable under 35 U.S.C. 103(a) over Bollinger et al. (U.S. patent 6,467,297) in view of Siniaguine.

**Claim 18** recites first and second vortex chambers to be positioned opposite to respective first and second portions of the article “for greater cooling of the first portion of the article by the one or more first vortex chambers than of the second portion of the article by the one or more second vortex chambers”.

Bollinger shows vortex chucks 32 (Figs. 2, 3, 5) positioned opposite to different portions of substrate 22. Bollinger does not teach or suggest different cooling by different chucks as recited in Claim 18, and does not teach or suggest that his device can provide the different cooling. Therefore, the “greater cooling” language structurally distinguishes Claim 18 over Bollinger. See MPEP 2173.05(g) and *In re Mills*, discussed above in connection with Issue 1 for Claim 18. Moreover, Bollinger does not provide a motivation for the different cooling as in Claim 18. Siniaguine is no more pertinent in that regard than Bollinger.

**Claim 24** recites “the first and second gas sources being operable to cause a gas emitted from the one or more first vortex chambers to be colder than a gas emitted from the one or more second vortex chambers.” Claim 24 is supported by Applicant’s specification, page 5, lines 13-14, but is not limited to the embodiments discussed therein.

Bollinger and Siniaguine, taken singly or together, do not teach or suggest this feature. The Examiner states:

Regarding claims 24 and 27 use of the cooling facilities would be ... intended use and would be a process limitation ....

The cooling language of Claim 24 is functional language structurally limiting the claim. See MPEP 2173.05(g) and *In re Mills*, discussed above in connection with Issue 1 for Claim 18.

**Claim 25** depends from Claim 24, and further recites “at least one angle drive for rotating the holder around an axis, wherein a minimum distance between the axis and the one or more first vortex chambers is smaller than a minimum distance between the axis and the one or more second vortex chambers.”

Bollinger and Siniaguine, taken singly or together, do not teach or suggest placing a vortex chamber emitting colder gas closer to a rotation axis than a vortex chamber emitting warmer gas as recited in Claim 25.

**Claim 26** depends from Claim 24, and further recites “at least one drive for moving an article ... so that at least a portion of the article directly opposite to the one or more second vortex chambers moves faster than at least a portion of the article opposite to the one or more first vortex chambers.”

Bollinger and Siniaguine, taken singly or together, do not teach or suggest that an article portion directly opposite to the one or more second vortex chambers (for warmer gas) would move faster as recited in Claim 26.

**Claim 27** depends from Claim 24, and further recites that “the first and second gas sources are operable to supply a gas to the first vortex chambers at a greater pressure than to the second vortex chambers.”

Bollinger and Siniaguine, taken singly or together, do not teach or suggest this feature. The Examiner’s statement that the feature of Claim 27 is “intended use” and “a process limitation” (Office Action, page 3, last paragraph) is not a proper basis for

disregarding this feature in the obviousness determination. See MPEP 2173.05(g) and *In re Mills*, discussed above in connection with Issue 1 for Claim 18.

The undersigned can be reached by telephone at the number given at the end of this Appeal Brief should questions arise about this case.



## **Appendix – Claims Involved in the Appeal**

1. An article holder comprising:

a first body surrounding a first vortex chamber and having gas inlet and outlet passages terminating at the first vortex chamber; and

a second body surrounding a second vortex chamber and having gas inlet and outlet passages terminating at the second vortex chamber;

wherein a combination of the first vortex chamber with all of the gas inlet and outlet passages terminating at the first vortex chamber is not geometrically identical to a combination of the second vortex chamber with all of the gas inlet and outlet passages terminating at the second vortex chamber.

2. The article holder of Claim 1 wherein all of the one or more gas inlets terminating at the first vortex chamber have a larger combined cross-sectional area than all of the one or more gas inlets terminating at the second vortex chamber.

3. The article holder of Claim 2 in combination with an apparatus for rotating the article holder around at least one axis, wherein a minimum distance between said axis and the first vortex chamber is smaller than a minimum distance between said axis and the second vortex chamber.

4. The article holder of Claim 1 wherein the first gas vortex chamber has more gas inlets than the second gas vortex chamber.

5. The article holder of Claim 4 in combination with an apparatus for rotating the article holder around at least one axis, wherein a minimum distance between said axis and the first vortex chamber is smaller than a minimum distance between said axis and the second vortex chamber.
7. The article holder of Claim 6 in combination with an apparatus for rotating the article holder around at least one axis, wherein a minimum distance between said axis and the first vortex chamber is smaller than a minimum distance between said axis and the second vortex chamber.
8. An article holder having a surface which is to face an article held in the holder, the article holder comprising a plurality of vortex chucks having outlets in said surface, wherein the surface has a first portion having one or more outlets therein and a second portion having one or more outlets therein, the first and second portions have equal areas, and the first portion has more outlets per unit area than the second portion.
9. The article holder of Claim 8 in combination with an apparatus for rotating the article holder around at least one axis, wherein a minimum distance between said axis and the first portion of said surface is smaller than a minimum distance between said axis and the second portion.
10. An article holder having vortex chucks which are to emit gas vortices to hold an article, wherein all of the vortex chucks which are to emit vortices to hold an article have outlets in a surface which is to be face the article, wherein the surface consists of a first portion and a second portion, wherein the first portion has at least some of its area occupied

by at least a part of a vortex chuck outlet, and the second portion also has at least some of its area occupied by at least a part of a vortex chuck outlet, wherein the first portion has a larger percentage of its area occupied by the vortex chuck outlets than the second portion.

11. The article holder of Claim 10 in combination with an angle drive having an arm attached to the article holder and having an axis of rotation, wherein all of the first portion of said surface lies closer to said axis than all of the second portion.

12. The article holder of Claim 10 wherein the first and second portions have equal areas.

18. An apparatus comprising an article holder comprising one or more first vortex chambers to be positioned opposite to a first portion of the article, and one or more second vortex chambers to be positioned opposite to a second portion of the article, for greater cooling of the first portion of the article by the one or more first vortex chambers than of the second portion of the article by the one or more second vortex chambers.

19. The apparatus of Claim 18 further comprising at least one angle drive for rotating the article holder around an axis, wherein a minimum distance between the axis and the one or more first vortex chambers is smaller than a minimum distance between the axis and the one or more second vortex chambers.

20. The apparatus of Claim 18 further comprising at least one drive for moving the article while the article is held in the holder so that at least a portion of the article directly

opposite to the one or more second vortex chambers moves faster than at least a portion of the article opposite to the one or more first vortex chambers.

21. An apparatus comprising an article holder comprising one or more first vortex chucks and one or more second vortex chucks, the first and second vortex chucks being to emit gas vortices to hold an article, wherein during operation each of the one or more first vortex chucks emits more gas per unit of time than each of the one or more second vortex chucks.

22. The apparatus of Claim 21 further comprising at least one angle drive for rotating the article holder around an axis, wherein a minimum distance between the axis and the one or more first vortex chucks is smaller than a minimum distance between the axis and the one or more second vortex chucks.

23. The apparatus of Claim 21 further comprising at least one drive for moving the article while the article is held in the holder so that at least a portion of the article directly opposite to the one or more second vortex chucks moves faster than at least a portion of the article opposite to the one or more first vortex chucks.

24. An apparatus comprising an article holder comprising:

one or more first vortex chambers;

one or more first gas sources for supplying gas to the one or more first vortex chambers;

one or more second vortex chambers; and

one or more second gas sources for supplying gas to the one or more second vortex chambers, the first and second gas sources being operable to cause a gas emitted from the one or more first vortex chambers to be colder than a gas emitted from the one or more second vortex chambers.

25. The apparatus of Claim 24 further comprising at least one angle drive for rotating the holder around an axis, wherein a minimum distance between the axis and the one or more first vortex chambers is smaller than a minimum distance between the axis and the one or more second vortex chambers.

26. The apparatus of Claim 24 further comprising at least one drive for moving an article while the article is held in the holder so that at least a portion of the article directly opposite to the one or more second vortex chambers moves faster than at least a portion of the article opposite to the one or more first vortex chambers.

27. The apparatus of Claim 24 wherein the first and second gas sources are operable to supply a gas to the first vortex chambers at a greater pressure than to the second vortex chambers.

28. An apparatus comprising an article holder comprising:

one or more first vortex chambers;

one or more first gas sources for supplying gas to the one or more first vortex chambers;

one or more second vortex chambers; and

one or more second gas sources for supplying gas to the one or more second vortex chambers, the first and second gas sources being operable to supply a gas to the first vortex chambers at a greater pressure than to the second vortex chambers.

29. The apparatus of Claim 28 further comprising at least one angle drive for rotating the holder around an axis, wherein a minimum distance between the axis and the one or more first vortex chambers is smaller than a minimum distance between the axis and the one or more second vortex chambers.

30. The apparatus of Claim 28 further comprising at least one drive for moving an article while the article is held in the holder so that at least a portion of the article directly opposite to the one or more second vortex chambers moves faster than at least a portion of the article opposite to the one or more first vortex chambers.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on June 2, 2004.	
<i>Michael Shenker</i>	<i>6-2-04</i>
Attorney for Applicant(s)	Date of Signature

Respectfully submitted,

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## PATENT ABSTRACTS OF JAPAN

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(21)Application number : 55-120206

(71)Applicant : KONISHIROKU PHOTO IND CO  
LTD

(22)Date of filing : 30.08.1980

(72)Inventor : ITO KUNIO  
NINOMIYA KAZUO  
SAITO SHUN

## (54) CLEANING AND DRYING DEVICE FOR SPINNER

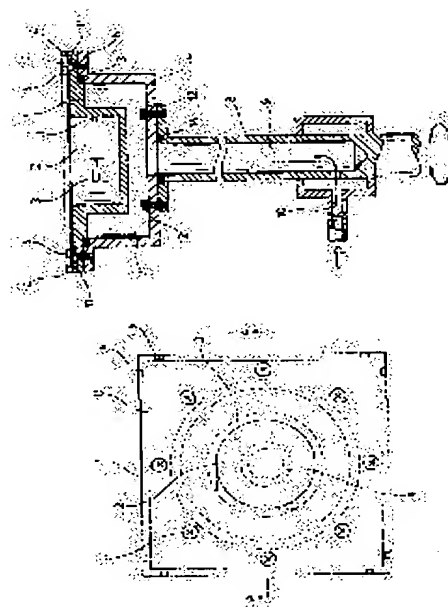
## (57)Abstract:

PURPOSE: To clean and dry a substrate by method wherein a swirl-making chamber is provided on the surface of a rotatable retaining stand which retains the substrate, a fluid is jetted out and a swirl is formed in the swirl-making chamber and by utilizing the negative pressure of the swirl, the substrate is retained at the position lifted up from the surface of the retaining stand.

CONSTITUTION: The swirl-making chamber 2 having a round aperture is formed on the surface of the rotatable retaining stand 1 whereon the substrate O is carried and an introducing hole 3 is provided in the direction of tangential line on the side wall of the swirl-making chamber 2. At the end section of the retaining stand 1, protrusions 4 to be used for control of the sliding of the

substrate O are provided. The cleaning and drying of the substrate is performed as follows.

First, when a compressed fluid is feeded to a compressed chamber 7, the compressed fluid passes through the introducing hole 3 and jets into the swirl-making chamber 2 and a swirl is generated. The substrate O is adsorbed to the retaining stand 1 with the help of the negative pressure generated by the swirl, but as the fluid flows in the direction of the end section



passing through the space between the substrate and the retaining stand 1, the reverse side of the substrate O is retained without coming into contact with the retaining stand 1. The cleaning of the surface of the substrate O is performed by rotating the retaining stand under the abovementioned state of condition and subsequently, the substrate is dried up by performing centrifugal dehydration.

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## LEGAL STATUS

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⑬ 日本国特許庁 (JP)

⑪ 特許出願公開

⑫ 公開特許公報 (A)

昭57-45233

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審査請求 未請求

(全 4 頁)

⑭ スピンナー洗浄乾燥装置

① 特 願 昭55-120206

② 出 願 昭55(1980)8月30日

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明 細 書

1. 発明の名称

スピナー洗浄乾燥装置

2. 特許請求の範囲

基板を保持する回転可能な保持台の表面に円形の内形の開口を持つ滴室を設けると共に、該滴室の側壁に導入孔を形成し、該導入孔から圧縮気体若しくは加圧液体を前記滴室内に噴出させて滴を生成せしめ、該滴によつて前記滴室に生じた負圧を利用し、基板を前記保持台表面から浮上した位置で保持するようにしたことを特徴とするスピナー洗浄乾燥装置。

3. 発明の詳細な説明

本発明はスピナー洗浄乾燥装置に関するものである。

半導体集積回路の製造に使用されるマスクの製造工程においては、研磨されたガラス基板およびクロム等が成膜されたマスク基板に付着した、ノミクロン程度の異物をも除去する高度の洗浄が要求される。

この基板の洗浄乾燥方法として従来から用いられている一つの方法として、複数台の超音波洗浄槽を使用し、まず硝酸等を含む液や洗剤を含む液で洗浄し、次に純水で洗浄し、その後イソプロピルアルコールやフレオンの蒸気で乾燥する方法がある。しかしこの方法ではマスク基板に要求される十分な洗浄品質を得ることが困難であり、又、ガラス基板洗浄後に成膜した膜にピンホールの発生が多いという問題があった。又、この方法の問題点を解決した洗浄乾燥方法として、回転可能な保持台に基板を取り付け、この保持台を回転させながら、基板表面に回転ブラシを接触させたり高圧純水を吹きつけたりして洗浄した後、保持台を比較的高速で回転させることによつて、基板の速い脱水および乾燥を行うという方法がある。しかし、この従来者の方法を具体化したスピナー洗浄乾燥装置として、現在知られているものは、全て基板を保持台上に真空吸着等により取り付けるものであるため、基板の裏面に傷をつけたり、裏面を汚し

たりする欠点や、裏面の乾燥が不充分であるという欠点がある。

本発明は上記欠点を除去するものであり、その目的は、基板の裏面に傷や汚れが発生せず、又、裏面の乾燥をも充分に行えるスピナー洗浄乾燥装置を提供することにある。

上記目的を達成するため本発明の基本的構成は、基板を保持する回転可能な保持台の表面にほぼ円形の開口を持つ渦室を設けると共に、渦室の側壁に導入孔を形成し、この導入孔から圧縮気体若しくは加圧液体を渦室内に噴出させて渦を生成せしめ、この渦によつて渦室に生じた負圧を利用し、基板を保持台表面から浮上した位置で保持するようにしたことを特徴とするものである。

以下図面を用いながら本発明を詳細に説明する。

第1図は本発明に係るスピナー洗浄乾燥装置の主要部の一実施例を示す平面図、第2図は第1図のA-A断面図である。第1図及び第2図

洗浄乾燥装置を用いて基板を洗浄及び乾燥する場合を説明する。

まず、圧縮気体を供給部10から回転軸8内の供給路9を用いて圧力室7に供給する。圧力室7へ供給された圧縮気体は導入孔3を通つて渦室2へ噴出し、渦室2の側壁の円周方向に流れ渦室2内に渦を発生し、その後外部へ流出する。この状態の保持台1の表面側へ基板0を置くと、上記渦によつて渦室2に生じている負圧により、基板0は保持台1の方向に吸引される。しかし、基板0と保持台1との間から保持台1の端部方向へ気体が流出するため、基板0は保持台1から浮いた状態にある。即ち、基板0の裏面は保持台1に接触することなく保持されている。この状態で保持台1を回転させながら、回転ブラシや高圧水吹付等の手段(図示せず)を用いて基板0の表面を洗浄し、その後比較的高速で支持台1を回転させて、遠心脱水による乾燥を行う。

このように基板0の裏面が保持台1に接触す

において、1は基板0を保持する回転可能な保持台で、この保持台1には、保持台1表面に円形状の開口を持つ渦室2が設けられている。さらに、この渦室2の側壁には、側壁の接線方向に開口した導入孔3が形成されている。4は保持台1の端部に固着された突起で、基板0がスライドするのを規制するためのものである。5は円筒状のケースで、一方の端部にフランジ6を有している。そして、このケース5の内面と保持台1の裏面とが圧力室7を形成している。8はモータ(図示せず)によつて駆動される回転軸で、中央は圧縮気体や加圧液体が送られるための供給路9が形成されている。10は圧縮気体や加圧液体の供給部で、この供給部10において、回転軸8の供給路9が開口している。11は保持台1とケース5とを結合する皿小ねじ、12はケース5と回転軸8とを結合するボルト、13及び14は上記接合部の間隙をシールするリングである。

以上のような構成の本発明に係るスピナー

ることなく保持されるので、基板0の裏面に傷や汚れが生ずることなく、又、裏面の乾燥も充分行える。さらに、基板0の裏面を純水等で洗浄する必要があるときは、圧縮気体の代わりに純水等を供給部10から供給し、その後の乾燥時に再び圧縮気体を供給すれば良い。

第3図は本発明に係るスピナー洗浄乾燥装置の基板吸引力の一例を示す図で、渦室2の内径が40mm、深さが20mm、導入孔3の内径が2mmの場合における、圧縮気体の圧力Pと吸引力Fとの関係を示すものである。この図から明らかなように、圧縮気体の圧力Pが1kg/cm<sup>2</sup>であつても吸引力Fは0.7kgであり、保持台1の回転中に基板0が脱落することはない。

尚、上記説明における圧縮気体としては、空気や窒素ガス等を用い、加圧液体としては水等を用いれば良い。さらに、基板0の脱落防止用の突起4の高さは、基板0の厚みと保持台1からの基板0の浮上量との和程度で充分である。また、上記実施例では保持台1に一個の渦室2

を設けたが、平面図である第4図及び第4図の  
B B 断面図である第5図に示すように、保持台  
1を二以上の保持台（この実施例では/a、/b、  
/c、/d）に分割し、各々に渦室2を設けるよ  
うに構成することもできる。さらに、本発明に

係るスピナー洗浄乾燥装置は、正方形のマ  
スク基板のみならず、円形の半導体ウエーハや種  
々の形状の板状物の洗浄及び乾燥に応用できる。

以上説明したように、本発明に係るスピナ  
ー洗浄乾燥装置によれば、基板の裏面に傷や汚  
れを生ずることなく洗浄乾燥ができ、しかも裏  
面の乾燥も充分に行える。

#### 4. 図面の簡単な説明

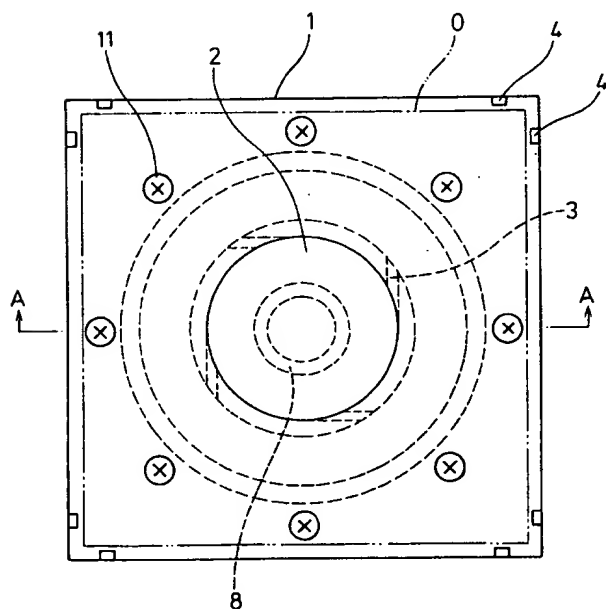
第1図は本発明に係るスピナー洗浄乾燥装  
置の主従部の一実施例を示す平面図、第2図は  
第1図のA A 断面図、第3図は本発明に係るズ  
ピナー洗浄乾燥装置の基板吸引力の一例を示  
す図、第4図は本発明に係るスピナー洗浄乾  
燥装置の他の実施例を示す平面図、第5図は第  
4図のB B 断面図である。

1 … 保持台  
3 … 導入孔  
5 … ケース  
7 … 圧力室  
9 … 供給路

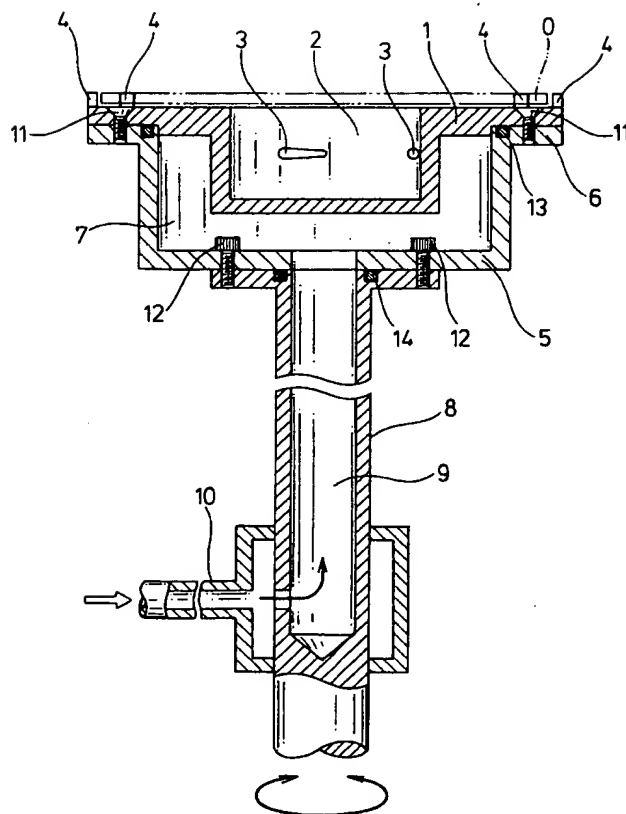
2 … 渦 室  
4 … 突 起  
6 … フランジ  
8 … 回転軸  
10 … 供給部

特許出願人 小西六写真工業株式会社  
代 理 人 弁理士 井 島 藤 治

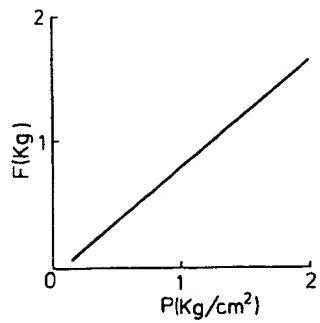
第 1 図



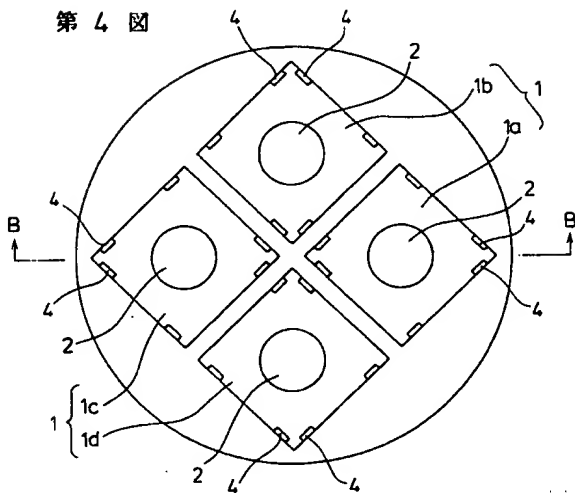
第 2 図



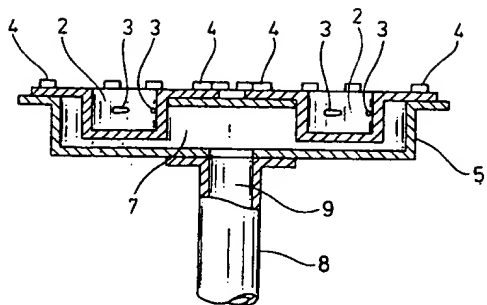
第 3 図



第 4 図



第 5 図



The first question is: "Do you find that Hesston was the first to conceive the invention."

Now let me translate that question. . . . Translated, what that means is: Do you find by clear and convincing evidence that Hesston was the first to conceive the invention.

J. App. 3540-3544.

[3] Although these instructions do not explicitly require that the inventor's testimony on conception must be corroborated, they do instruct the jury to consider testimony or other pieces of evidence in light of all the evidence and to seek clear and convincing evidence of conception. In view of these instructions as a whole, and the evidence of record, we do not believe that the jury was confused on the issue of corroboration.

Second, the trial judge, in his November 1989 Supplemental Judgment Order, awarded Sperry one-half its attorney fees, based on Fed.R.Civ.P. 11 and 37(c), because New Idea wrongfully refused to admit certain facts during discovery. The judge further stated in that order:

Should the Court of Appeals agree with the defendants that they were not required to prove that Burkhart was the first to conceive the invention then, of course, 100 percent of the reasonable cost of proving the "Hesston facts" should be awarded.

*New Idea Farm Equipment Corp. v. Sperry Corp.*, No. 84-C-10665, slip op. at 4 (N.D. Ill. November 6, 1989).

Sperry now contends that it was not necessary to prove Burkhart's conception, which New Idea should have admitted during discovery; Sperry therefore claims that it is entitled to the other half of its attorney fees. We disagree. An award of attorney fees under Rules 11 or 37 is subject to our review under an abuse of discretion standard. See *National Hockey League v. Metropolitan Hockey Club, Inc.*, 427 U.S. 639, 642, 96 S.Ct. 2778, 2780, 49 L.Ed.2d 747, 751 (1976). No such abuse was shown. Moreover, the outcome of the case could not have been nearly as clear at trial as hindsight might now indicate. Finally, proof of Burkhart's conception was relevant and necessary for Sperry to prevail. We see no abuse of the trial judge's discretion in not awarding the other half of the attorney fees to Sperry.

We have considered all the other points raised by New Idea, but find no reversible error.

### III CONCLUSION

As indicated by its denial of New Idea's post-trial motions, the district court was not convinced by the record before the jury that a reasonable person could not have reached a verdict for Sperry or that the jury was misled. We are equally unpersuaded. New Idea has not convinced us that the jury's findings are not supported by substantial evidence, that those findings cannot support the legal conclusions drawn by the jury or the judge, or that the judge abused his discretion in denying New Idea's motion for a new trial or for JNOV. Therefore, the judgment is affirmed.

AFFIRMED

#### Court of Appeals, Federal Circuit

In re Mills

No. 90-1184

Decided October 9, 1990

#### PATENTS

##### 1. Patentability/Validity — Obviousness — Relevant prior art — Particular inventions (§115.0903.03)

Apparatus which produces aerated cementitious composition by driving output pump for its mixing chamber at capacity greater than feed rate of ingredients into mixing chamber, and thereby drawing air into composition, is not obvious in view of prior patent for mixing apparatus, even though device of prior patent provides for regulation of flow rate into mixing chamber, since patent contains no suggestion or motivation for overdriving output pump so as to entrain air in mixed ingredients.

##### 2. Patentability/Validity — Anticipation — In general (§115.0701)

##### Patentability/Validity — Obviousness — Relevant prior art — In general (§115.0903.01)

Board of Patent Appeals and Interferences erred by requiring applicant to show that prior art reference lacked functional characteristics of claimed device, since even though such requirement would be proper for rejection based on lack of novelty, it is not

### III CONCLUSION

The denial of New Idea's appeal by the district court was not based before the jury that could not have reached a verdict that the jury was misinformed. New Idea that the jury's findings are supported by substantial evidence, cannot support the legal conclusion of the jury or the judge, based on his discretion in granting a new trial or, otherwise, the judgment is affirmed.

**AFIRMED**

**U.S. Federal Circuit**

**U.S. Mills**

**90-1184**

**October 9, 1990**

**Validity — Obviousness —  
Prior art — Particular inven-  
tion (3.03)**

produces aerated cement by driving output pump means at capacity greater than the feed rate of the ingredients into mixing chamber by drawing air into composition in view of prior patent art, even though device of means for regulation of flow chamber, since patent con- sideration for over- come so as to entrain air in

**Validity — Anticipation —  
(5.0701)**

**Validity — Obviousness —  
Prior art — In general**

to Appeals and Interfer- ences applicant to show evidence lacked functional claimed device, since even argument would be proper on lack of novelty, it is not

pertinent whether prior art device possesses claimed invention's functional characteristics if, as here, application was rejected on basis of obviousness and reference does not describe or suggest claimed invention's structure.

Appeal from the U.S. Patent and Trade- mark Office, Board of Patent Appeals and Interferences.

Patent application of Peter S. Mills, serial no. 891,374, continuation of serial no. 607-805, filed May 4, 1984. From decision upholding examiner's rejection of claims 6-9 and 11-14, applicant appeals. Reversed.

James C. Wray, McLean, Va, for appellant.

Muriel E. Crawford, assistant solicitor (Fred E. McKelvey, solicitor, with her on brief), for appellee.

Before Miller, senior circuit judge, and Mayer and Lourie, circuit judges.

**Lourie, J.**

This appeal is from the November 2, 1989, decision of the United States Patent and Trademark Office Board of Patent Appeals and Interferences (Board), Appeal No. 88-0141, affirming the examiner's rejection, under 35 U.S.C. §103, of claims 6-9 and 11-14 in Mills' application Serial No. 891,374, a continuation of Serial No. 607-805, filed May 4, 1984, entitled "Methods of and Apparatus for Producing Aerated Cementitious Compounds." The remainder of the claims (1-5, 10, and 15) have all been cancelled. We reverse.

## I BACKGROUND

### A. The Invention

Mills' claimed invention is an apparatus for producing aerated cementitious compositions. Claim 6 is the broadest claim:

6. Apparatus for producing an aerated cementitious composition, comprising a mixing chamber being open to atmosphere and containing mixing means, feed means for feeding ingredients comprising cement, foaming agent and liquid to the mixing chamber,

mixing means for mixing ingredients fed to the mixing chamber, pump means for pumping the mixed ingredients to a desired site and having a pump inlet connected to an outlet of the mixing chamber, drive motor means connected through gearbox means providing a pumping capacity of the pump means greater than the feed rate of the ingredients to the mixing chamber provided by the feed means, such that in operation air is drawn into the mixing chamber, and entrained in the mixed ingredients.

The essence of Mills' invention is the machine's ability to aerate a cementitious composition by driving the output pump at a capacity greater than the feed rate, thereby drawing air into the composition. This aeration produces a composition with substantially lower density than standard cementitious composition mixing ingredients.

### B. The Reference

The sole reference upon which the Board relied in affirming the examiner's rejection was Mathis et al. U.S. Patent 4,117,547 (Mathis).<sup>1</sup> Mathis discloses a mixing chamber which is open to the atmosphere and which contains a mixing means. Two feed means for feeding ingredients in the mixing chamber are provided. The first feed means may consist of a screw conveyer and the second, a flow metering device such as an adjustable valve. A pump means pumps the mixture from the mixing chamber to a desired site and a drive motor means is connected to mixing means and pump means. A separate motor drives the feed means.

A control system exists to arrest the feed means so as not to overfill the mixing chamber. This system comprises a level detector in the mixing chamber, which signals the feed means to close when the mixing chamber stores the predetermined maximum permissible quantity of material.

<sup>1</sup> The examiner rejected the claims at issue under 35 U.S.C. §103 as being unpatentable not only over Mathis but also in view of Gibson et al. U.S. Patent 2,717,770. However, the Board affirmed the examiner's rejection of claims 6-9 and 11-14 based solely on the Mathis reference. With regard to Gibson the Board stated:

We view the teachings of Gibson at best as being merely confirmatory of the fact that aerated mixtures can be produced by machines in which a pump means operates upon a mixing chamber at a greater rate than the ingredients are fed thereunto so that air is drawn into the mixing chamber and entrained in the mixed ingredients.

App. 2.

### C. The Rejection

The Board affirmed the examiner's Section 103 rejection of claims 6-9 and 11-14, "finding correspondence in the Mathis reference for all of the subject matter recited in the appellants' claims. . . ." With regard to Mills' claim language relating to aerating the mixture, the Board stated: "[i]n our opinion, the differences between claim 6 and the Mathis machine . . . lie solely in the functional language of the claim." The Board further found that Mathis teaches the use of separate input and output motors in order to permit the various mixing means and pumps to operate at different rates, and that Mathis "contemplates a situation wherein the rate of the outlet pump would be greater than the inlet pumps. . . ." The Board concluded on this point: "[w]e are of the opinion that the Mathis machine is capable of being operated in such a fashion as to cause [the output] pump 18 to draw air into the mixing chamber 17 so that it is entrained in the mixture."

The Board also agreed with Mills' contention that Mathis is not directed to the problem of producing aerated cementitious material, but noted that Mills is not claiming a method, but an apparatus, and all of Mills' apparatus structure is present in the Mathis machine.

## II DISCUSSION

All of the rejected claims are apparatus claims. The Board found "correspondence in the Mathis reference for all of the subject matter recited in appellants' claims" and that "[t]he Mathis machine discloses all of the structure set forth in claim 1" (a method claim not before us). It asserts that the use of such a mechanism would have been obvious and that the differences between claim 6 and the Mathis machine lie solely in the functional language of the claim, the preamble merely stating an intended use for the machine. This language suggests a lack of novelty rejection under 35 U.S.C. §102, rather than an obviousness rejection. However, no Section 102 rejection has been made or is before us. What is before us is a rejection for obviousness, and we must decide whether the Board erred in that rejection.

We note first that nonobviousness is a question of law to be determined from the facts. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1535, 218 USPQ 871, 876 (Fed. Cir. 1983). We review the Board's

determination of obviousness, based on the scope and content of the Mathis reference and the differences between the Mathis reference and the Mills claims, for correctness or error. *In re Carleton*, 599 F.2d 1021, 1024 n.14, 202 USPQ 165, 169 n.14 (CCPA 1979).

[1] After reviewing the record, the arguments in the briefs, and the Mathis reference, we conclude that Mathis would not have rendered the claimed invention obvious. The closest Mathis comes to suggesting Mills' claimed apparatus is at column 3, lines 42-47, which states

[T]he rate at which the inlet 2b receives a solid constituent depends on the speed of the feed screw 4. Such speed can be regulated by a prime mover 6 which includes a variable-speed transmission.

This brief reference contains no suggestion of "pump means and the feed means providing a pumping capacity of the pump means greater than the feed rate of ingredients to the mixing chamber provided by the feed means, such that in operation air is drawn into the mixing chamber, and air entrained in the mixed ingredients," as provided for in Mills' claim 6. While Mathis' apparatus may be capable of being modified to run the way Mills' apparatus is claimed, there must be a suggestion or motivation in the reference to do so. See *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984) ("The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification."). We see no such suggestion. The apparatus claimed by Mills is different from that of Mathis, since the fact that motor 6 of Mathis (the feed means) can be run at a variable speed does not require that motor 20 (connected to the pump) be run at a lesser speed "such that in operation air is drawn into the mixing chamber and air entrained in the mixed ingredients."

[2] The Board found that the difference between the claimed subject matter and the prior art resided solely in functional language and that appellant had to show that the prior art device lacked the functional characteristics of the claimed device, citing *In re Ludtke*, 441 F.2d 660, 169 USPQ 563 (CCPA 1971). *Ludtke*, however, dealt with a rejection for lack of novelty, in which case it was proper to require that a prior art reference cited as anticipating a claimed invention be shown to lack the characteristics of the claimed invention. That proof would in fact negate the assertion that the claimed invention was described in the prior art. We are here, however, facing an obvious-

ness issue. prior art device characteristics reference does structure. The facts before us, error in affirming claims 6-9 and Mathis, and we

Court of A

Decide

### PATENTS

1. Practice and Trademark Appeals and rules practi

### JUDICIAL PROCEDURE

Procedure — bility (§410

Issue of whether is functional is r Appeals for Federal's final rejection did not clear ground for rejection functionality the of 37 CFR 1.19 decision by Board Interferences affi

### PATENTS

2. Patentability/ (§115.05)

Patentability/ (§115.17)

Board of Patentees erred by holding prosthesis is per se unpatentable prosthesis is hidden stage of its usefulness design cannot unless article is a



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ness issue. It is not pertinent whether the prior art device possesses the functional characteristics of the claimed invention if the reference does not describe or suggest its structure. That is the case here. Given the facts before us, we hold that the Board was in error in affirming the examiner's rejection of claims 6-9 and 11-13 as obvious in view of Mathis, and we therefore *reverse* the Board.

REVERSED

mal and intended use, since "normal and intended use" of article includes period beginning after completion of manufacture or assembly and ending with article's ultimate destruction, loss, or disappearance, and since only facts of specific case will establish whether article's design can be observed during that period in such manner as to demonstrate ornamentality.

### Court of Appeals, Federal Circuit

In re Webb

No. 90-1176

Decided October 11, 1990

#### PATENTS

1. Practice and procedure in Patent and Trademark Office — Board of Patent Appeals and Interferences — Rules and rules practice (§110.1105)

#### JUDICIAL PRACTICE AND PROCEDURE

##### Procedure — Judicial review — Appealability (§410.4603)

Issue of whether design for hip prosthesis is functional is not properly before Court of Appeals for Federal Circuit, since examiner's final rejection of design patent application did not clearly specify functionality as ground for rejection, and since ground of functionality therefore cannot, by operation of 37 CFR 1.196(a), be incorporated into decision by Board of Patent Appeals and Interferences affirming rejection.

#### PATENTS

2. Patentability/Validity — Subject matter (§115.05)

##### Patentability/Validity — Design patents (§115.17)

Board of Patent Appeals and Interferences erred by holding that design for hip prosthesis is per se "functional," and therefore unpatentable, solely on ground that prosthesis is hidden from view during final stage of its useful life, since particular article's design cannot be presumed functional unless article is always concealed in its nor-

Appeal from the U.S. Patent and Trademark Office, Board of Patent Appeals and Interferences.

Design patent application of John D. Webb, Jr., Roy Y. Hori, and George E. Simpson, serial no. 833,470. From decision upholding examiner's final rejection of sole claim in application, applicants appeal. Reversed and remanded.

Michael H. Baniak, of Willian, Brinks, Olds, Hofer, Gilson & Lione, Chicago, Ill. (Sandra A. Sellers, of Willian, Brinks, Olds, Hofer, Gilson & Lione, Washington, D.C., with him on brief), for appellant.

Nancy C. Slutter, associate solicitor (Fred E. McKelvey, solicitor, with her on brief), Arlington, Va., for appellee.

Before Archer, Plager, and Clevenger, circuit judges.

Clevenger, J.

This is an appeal from a decision of the U.S. Patent and Trademark Office Board of Patent Appeals and Interferences ("Board") affirming the final rejection of the sole claim of appellants' ("Webb") U.S. Design Patent Application Serial No. 833,470. The claim for "[t]he ornamental design for a grooved femoral hip stem prosthesis as shown and described," was "rejected as being unpatentable under 35 U.S.C. §171 as being directed to non-statutory subject matter." The design can be appreciated from Figure 2 of the application reproduced below.